PWS Labs

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1. git Repository Clone

Lab 에서 사용할 Git Repository url

https://github.com/Pivotal-Field-Engineering/pcf-ers-demo.git

```
$ git clone https://github.com/Pivotal-Field-Engineering/pcf-ers-demo.git

Cloning into 'pcf-ers-demo'...
remote: Counting objects: 1012, done.
remote: Compressing objects: 100% (22/22), done.
remote: Total 1012 (delta 5), reused 23 (delta 4), pack-reused 981
Receiving objects: 100% (1012/1012), 5.10 MiB | 2.13 MiB/s, done.
Resolving deltas: 100% (341/341), done.
```

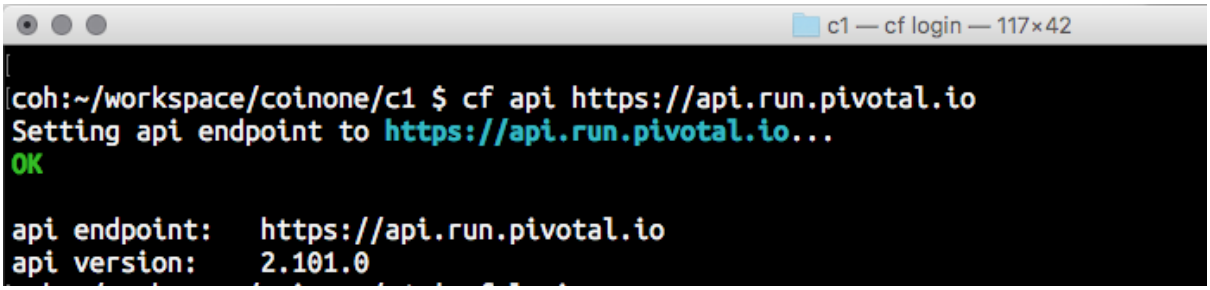
2. 데모 애플리케이션 빌드

```
coh:~/workspace/coinone/pcf-ers-demo $ mvn package
[INFO] Scanning for projects...
[INFO]
[INFO] ------------------------------------------------------------------------
[INFO] Building pcf-ers-demo1 0.0.1-SNAPSHOT
[INFO] ------------------------------------------------------------------------
[INFO]
[INFO] --- git-commit-id-plugin:2.2.2:revision (default) @ pcf-ers-demo1 ---
[INFO] dotGitDirectory /Users/coh/workspace/coinone/pcf-ers-demo/.git
[INFO] git.build.user.name pivotal-choonghyun-oh
[INFO] git.build.user.email coh@pivotal.io
[INFO] git.branch master
[INFO] --always = true
[INFO] --dirty = -dirty
…
```

3. PWS 에 애플리케이션 배포

3.1. cf api 로 PWS api end-point 설정

```
$ cf api https://api.run.pivotal.io
```



3.2. PWS 계정 로그인

Org 와 Space 는 원하는 곳을 선택

```
$ cf login
```

```
coh:~/workspace/coinone/c1 $ cf login
API endpoint: https://api.run.pivotal.io

Email> coh@pivotal.io

Password>
Authenticating...
OK

Select an org (or press enter to skip):
1. APJ
2. coh-org

Org> 2
Targeted org coh-org

Select a space (or press enter to skip):
1. development
2. production
3. staging

Space> 1
Targeted space development



API endpoint:   https://api.run.pivotal.io (API version: 2.101.0)
User:           coh@pivotal.io
Org:            coh-org
Space:          development
coh:~/workspace/coinone/c1 $
```

3.3. cf push 로 데모 애플리케이션 배포

3.3.1. manifest.yml 에서 애플리케이션 이름 변경(본인 식별 자를 Suffix 붙여 사용)

→ 아래 pws-coh 를 고유한 이름으로 변경

```
---
applications:
#- name: attendees
- name: pws-coh
  memory: 768M
  instances: 1
#  random-route: true
  path: target/pcf-ers-demo1-0.0.1-SNAPSHOT.jar
#  buildpack: java_buildpack
  services: []
  env:
    SPRING_PROFILES_ACTIVE: cloud
```

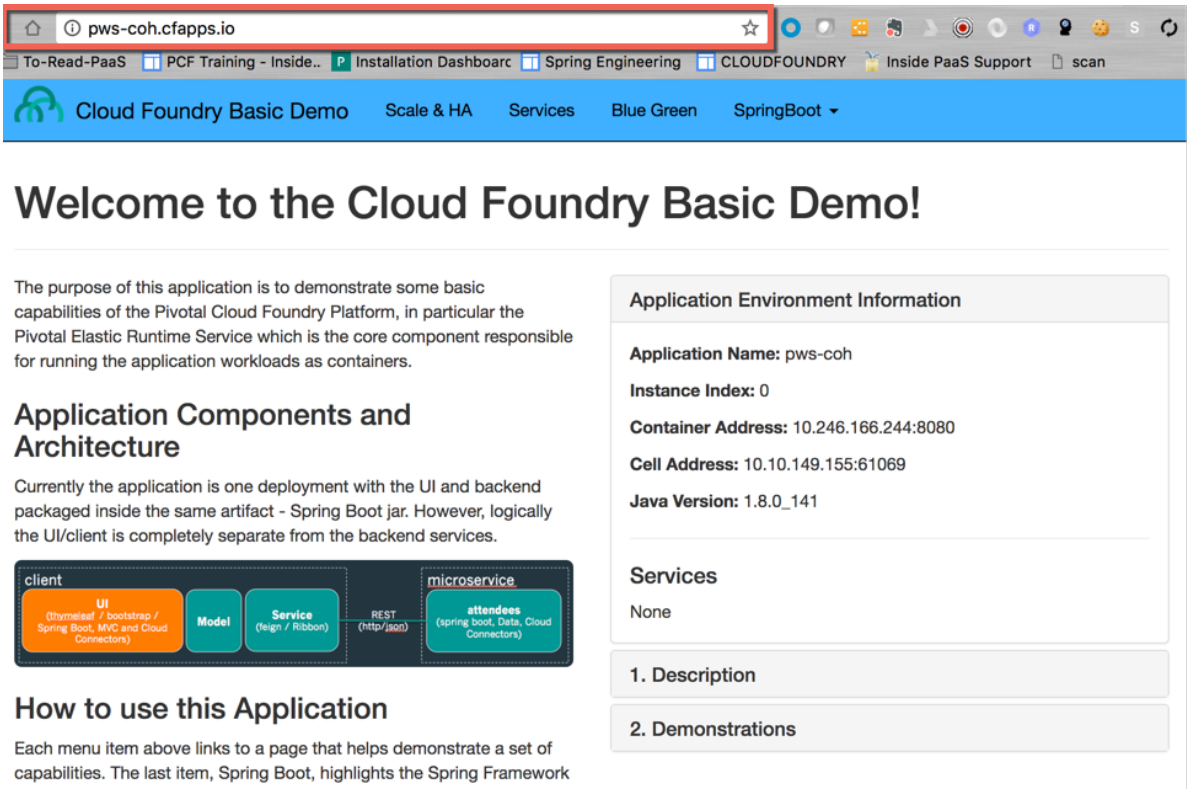
3.3.2. cf push

```
coh:~/workspace/coinone/pcf-ers-demo $ cf push

Using manifest file /Users/coh/workspace/coinone/pcf-ers-demo/manifest.yml

Creating app pws-coh in org coh-org / space development as coh@pivotal.io...
OK

Creating route pws-coh.cfapps.io...
OK

Binding pws-coh.cfapps.io to pws-coh...
OK

Uploading pws-coh...
Uploading app files from: /var/folders/z3/kwcd43vn3s71f901r0ny2cvm0000gn/T/unzipped-app616434889
Uploading 679.5K, 143 files
Done uploading
OK

Starting app pws-coh in org coh-org / space development as coh@pivotal.io...
Downloading binary_buildpack...
Successfully created container
Downloading staticfile_buildpack...
Downloading java_buildpack...
Downloading go_buildpack...
Downloading dotnet_core_buildpack...
Downloaded go_buildpack
Downloading ruby_buildpack...
Downloaded dotnet_core_buildpack
Downloading python_buildpack...
Downloaded java_buildpack
Downloading dotnet_core_buildpack_beta...
Downloaded python_buildpack
Downloading php_buildpack...
Downloaded staticfile_buildpack
Downloading nodejs_buildpack...
Downloaded dotnet_core_buildpack_beta
Downloaded ruby_buildpack
Downloaded nodejs_buildpack
```

```
Downloaded binary_buildpack
Downloaded php_buildpack
Creating container
Downloading app package...
Downloaded app package (34.4M)
-----> Java Buildpack v4.5 (offline) | https://github.com/cloudfoundry/java-buildpack.git#ffeefb9
-----> Downloading Jvmkill Agent 1.10.0_RELEASE from https://java-buildpack.cloudfoundry.org/jvmkill/trusty/x86_64/jvmkill-1.10.0_RELEASE.so (found in cache)
-----> Downloading Open Jdk JRE 1.8.0_141 from https://java-buildpack.cloudfoundry.org/openjdk/trusty/x86_64/openjdk-1.8.0_141.tar.gz (found in cache)
       Expanding Open Jdk JRE to .java-buildpack/open_jdk_jre (1.3s)
-----> Downloading Open JDK Like Memory Calculator 3.9.0_RELEASE from https://java-buildpack.cloudfoundry.org/memory-calculator/trusty/x86_64/memory-calculator-3.9.0_RELEASE.tar.gz (found in cache)
       Loaded Classes: 17708, Threads: 300
-----> Downloading Client Certificate Mapper 1.2.0_RELEASE from https://java-buildpack.cloudfoundry.org/client-certificate-mapper/client-certificate-mapper-1.2.0_RELEASE.jar (found in cache)
-----> Downloading Container Security Provider 1.8.0_RELEASE from https://java-buildpack.cloudfoundry.org/container-security-provider/container-security-provider-1.8.0_RELEASE.jar (found in cache)
-----> Downloading Spring Auto Reconfiguration 1.12.0_RELEASE from https://java-buildpack.cloudfoundry.org/auto-reconfiguration/auto-reconfiguration-1.12.0_RELEASE.jar (found in cache)
Exit status 0
Uploading droplet, build artifacts cache...
Uploading build artifacts cache...
Uploading droplet...
Uploaded build artifacts cache (129B)
Uploaded droplet (80.7M)
Uploading complete
Stopping instance 883dfff0-7d9c-4b0b-ac5d-bfacf6f2d735
Destroying container
Successfully destroyed container

0 of 1 instances running, 1 starting
0 of 1 instances running, 1 starting
1 of 1 instances running

App started


OK

App pws-coh was started using this command `JAVA_OPTS="-agentpath:$PWD/.java-buildpack/open_jdk_jre/bin/jvmkill-1.10.0_RELEASE=printHeapHistogram=1 -Djava.io.tmpdir=$TMPDIR -Djava.ext.dirs=$PWD/.java-buildpack/container_security_provider:$PWD/.java-buildpack/open_jdk_jre/lib/ext -Djava.security.properties=$PWD/.java-buildpack/security_providers/java.security $JAVA_OPTS" && CALCULATED_MEMORY=$($PWD/.java-buildpack/open_jdk_jre/bin/java-buildpack-memory-calculator-3.9.0_RELEASE -totMemory=$MEMORY_LIMIT -stackThreads=300 -loadedClasses=18417 -poolType=metaspace -vmOptions="$JAVA_OPTS") && echo JVM Memory Configuration: $CALCULATED_MEMORY && JAVA_OPTS="$JAVA_OPTS $CALCULATED_MEMORY" && SERVER_PORT=$PORT eval exec $PWD/.java-buildpack/open_jdk_jre/bin/java $JAVA_OPTS -cp $PWD/. org.springframework.boot.loader.JarLauncher`

Showing health and status for app pws-coh in org coh-org / space development as coh@pivotal.io...
OK

requested state: started
instances: 1/1
usage: 768M x 1 instances
urls: pws-coh.cfapps.io
last uploaded: Wed Jan 17 16:20:27 UTC 2018
stack: cflinuxfs2
buildpack: client-certificate-mapper=1.2.0_RELEASE container-security-provider=1.8.0_RELEASE java-buildpack=v4.5-offline-https://github.com/cloudfoundry/java-buildpack.git#ffeefb9 java-main java-opts jvmkill-agent=1.10.0_RELEASE open-jdk-like-jre=1.8.0_1...

     state     since                  cpu    memory         disk         details
#0   running   2018-01-18 01:21:46 AM   121.0%   272.3M of 768M   162.2M of 1G
```

3.3.3. 데모 애플리케이션 확인

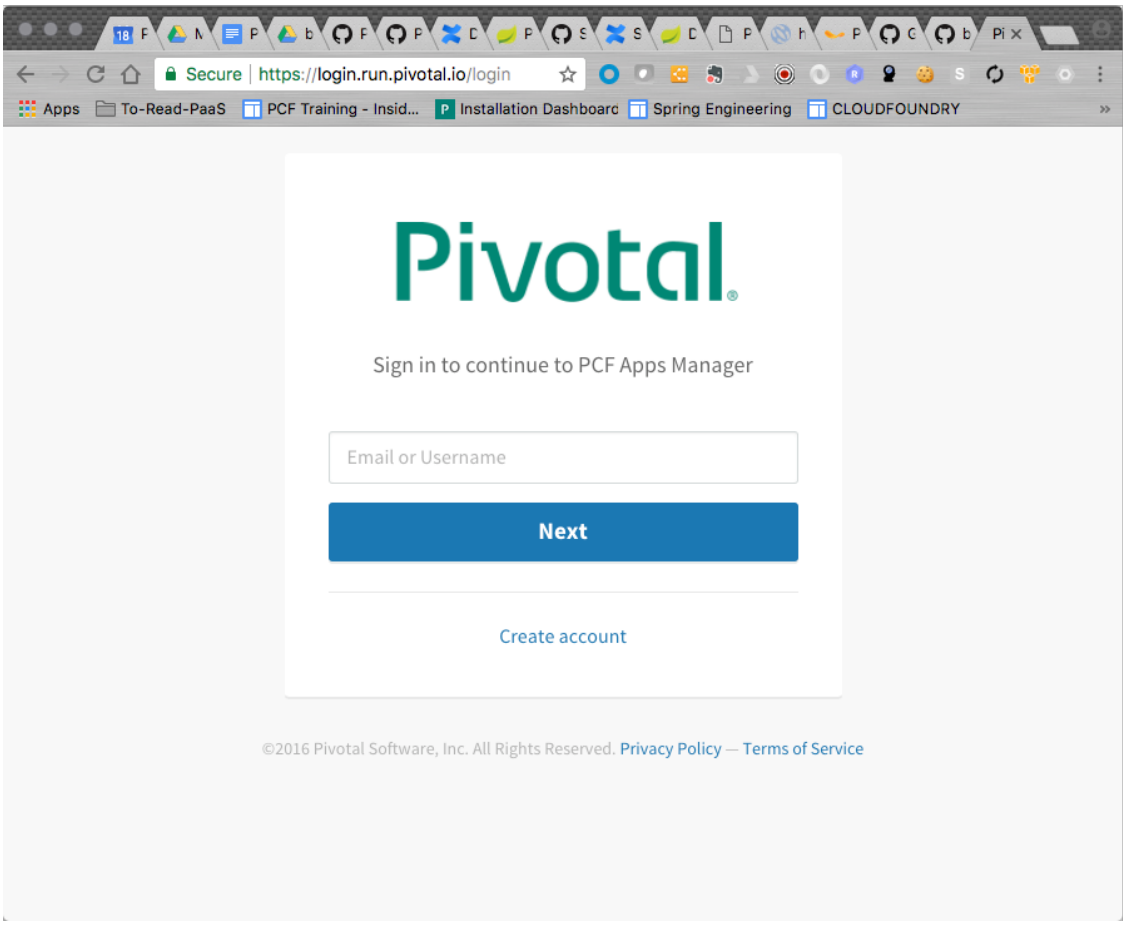
PWS 에 배포한 App url 확인



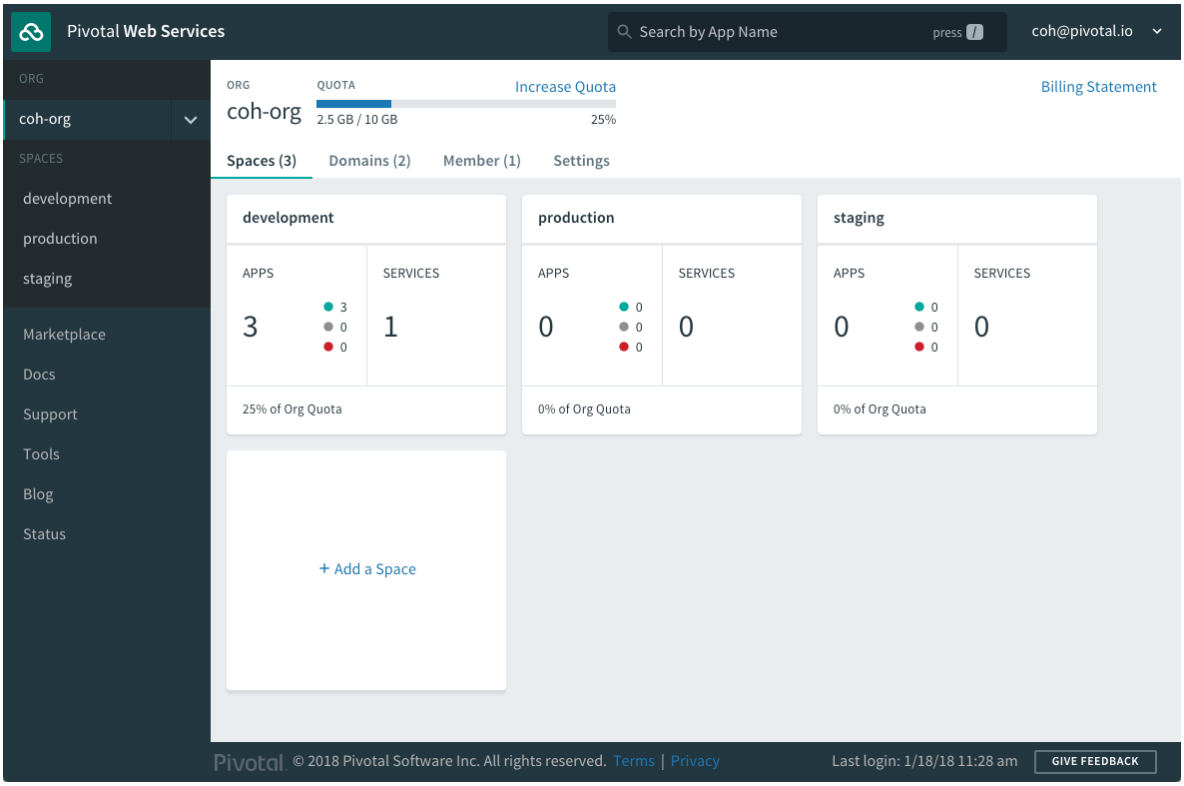
4. **PWS Apps Manager 둘러보기**

   URL: https://console.run.pivotal.io

   ID/PW: 본인 등록 이메일/암호



로그인 후 초기 화면



ORG

- 개인 또는 복수의 협업자가 소유하고 사용할 수 있는 개발 공간
- org 에 할당된 리소스, 애플리케이션을 공유하고 관리
- 사용자 그룹을 구성하는 논리적인 단위
- 일반적으로 회사, 부서, 애플리케이션 제품, 프로젝트 단위로 구성
- 복수 개 spaces를 가질 수 있음

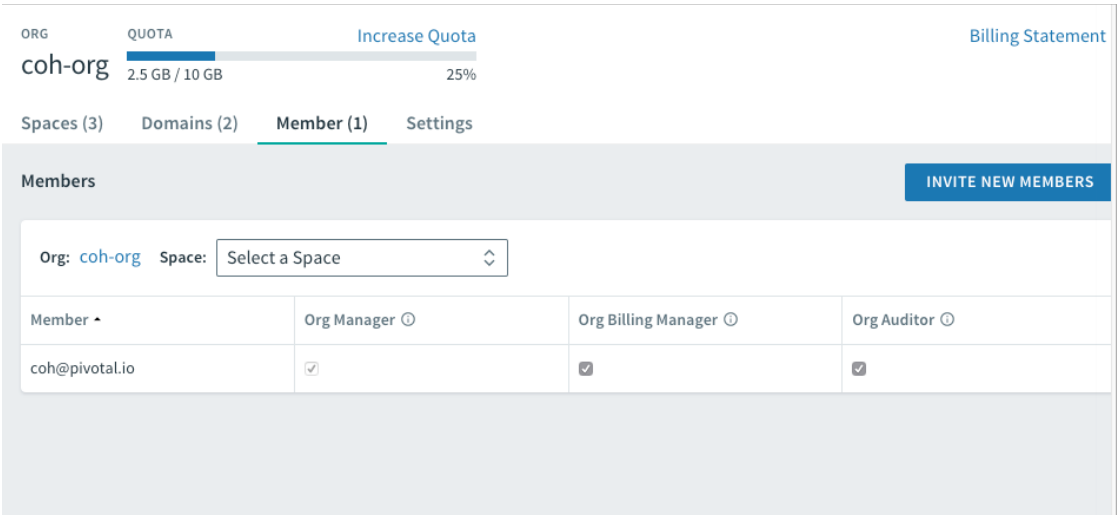
SPACE

- 모든 앱과 서비스는 space 에 소속됨, org 는 최소 한개의 space 를 가져야 함
- 앱 개발, 배포, 관리를 위한 공간을 제공
- ORG 하위에서 사용자와 리소스를 구성하는 단위
- 일반적으로 development, staging, production 과 같이 구분
- 애플리케이션과 서비스는 스페이스로 구분하여 관리

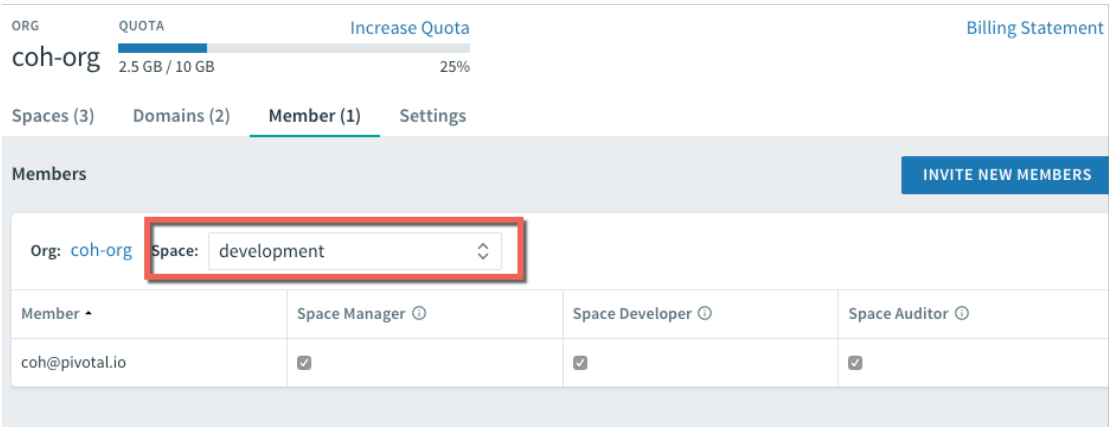
Roles and permission

- 사용자는 한 개 이상의 Role 을 가질 수 있음

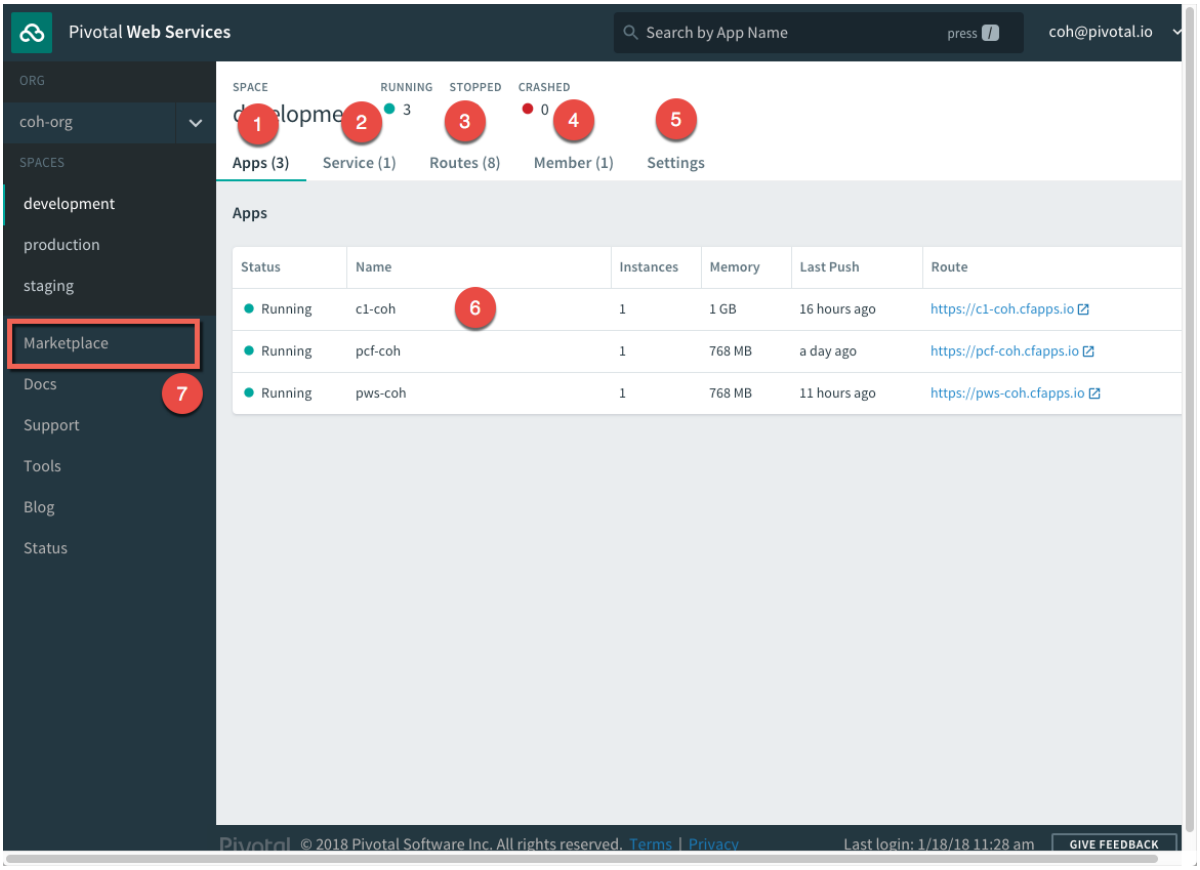
ORG Roles:
Org Manager, Org Billing Manager, Org Auditor



Space Roles:
Space Manager, Space Developer, Space Auditor



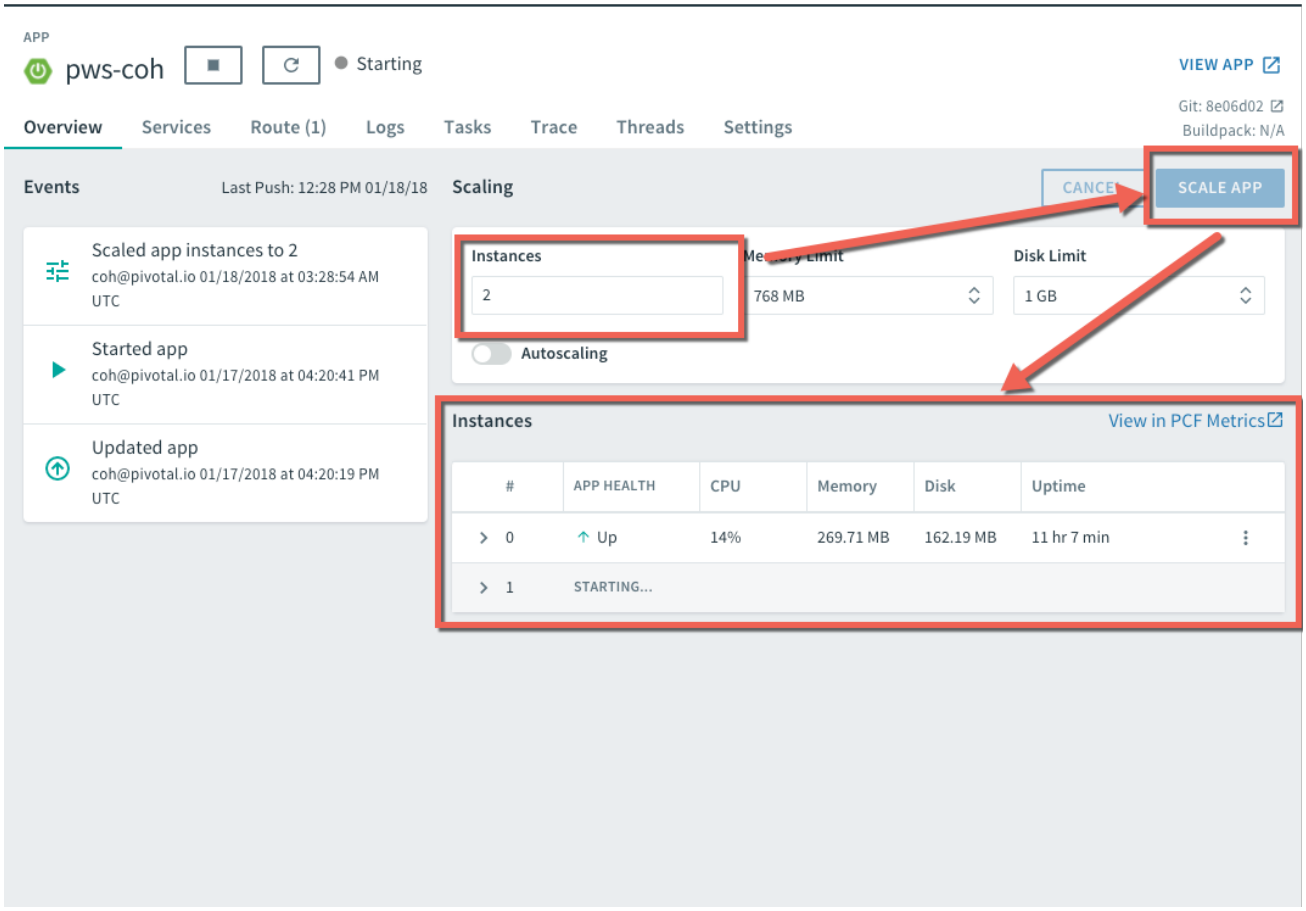
Apps Manager 둘러보기



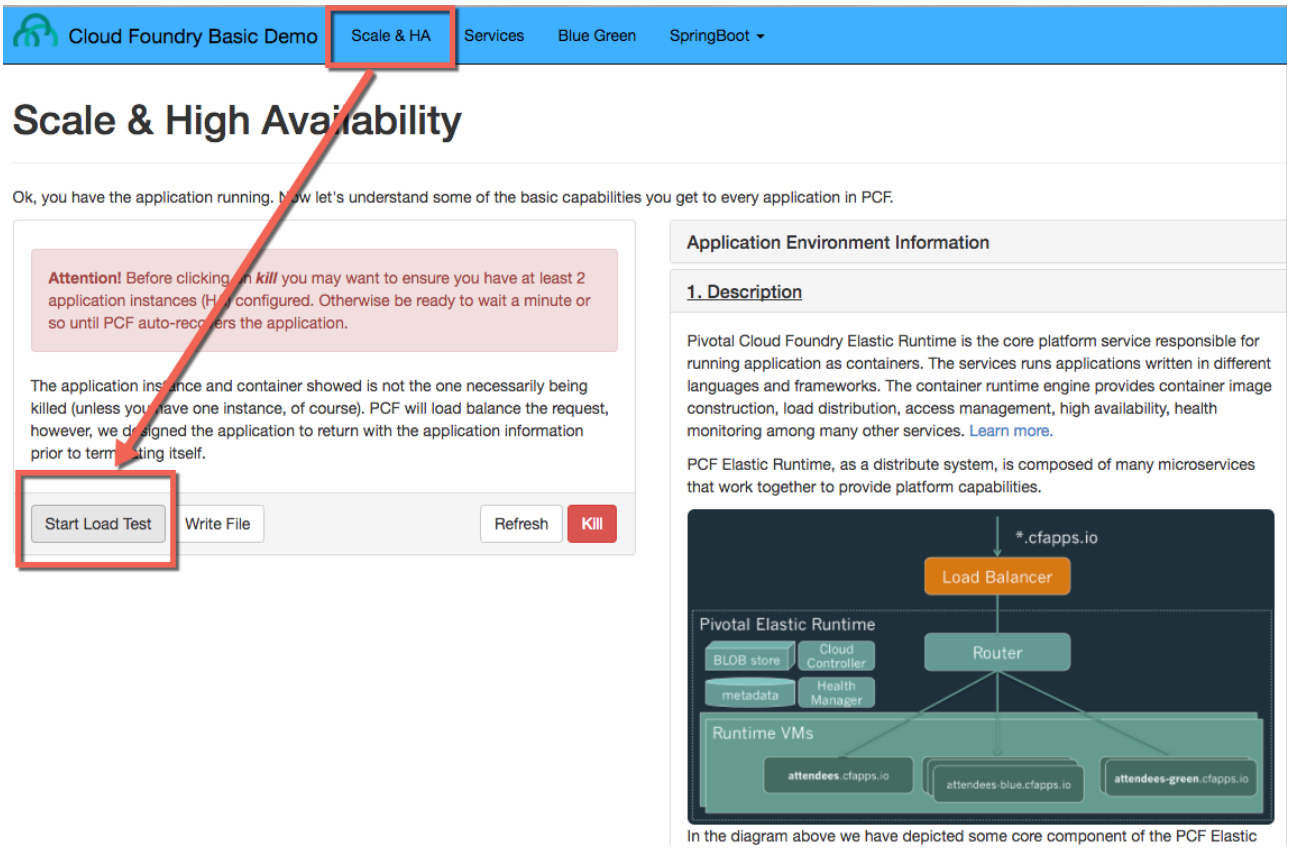
5. Scale out / Scale up

App Manager 에서 App 을 선택하고 Instance 개수를 2 개로 변경 후, “Scale App”을 클릭하여 인스턴스를 2 개로 **Scale out.**

“Instances” 테이블에 App Health 가 “Up”으로 변경될 때까지 대기

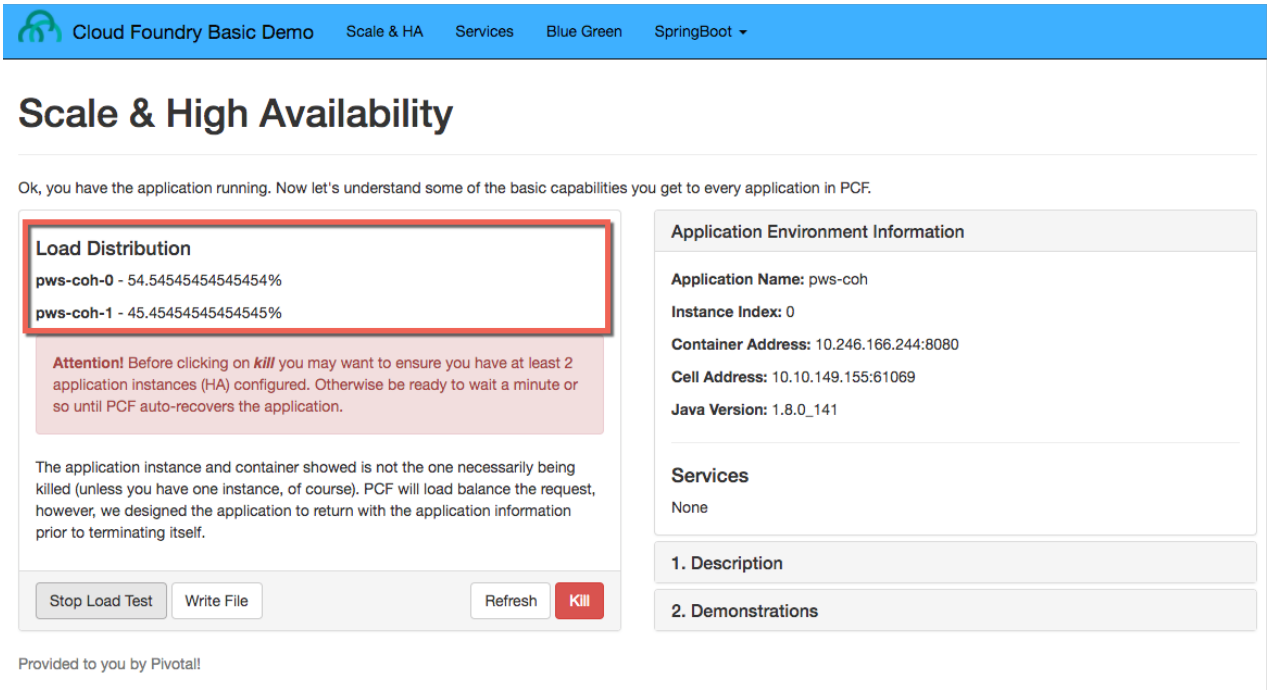


“Start Load Test”를 클릭하여 두개의 instance 가 서비스 제공하는지 확인

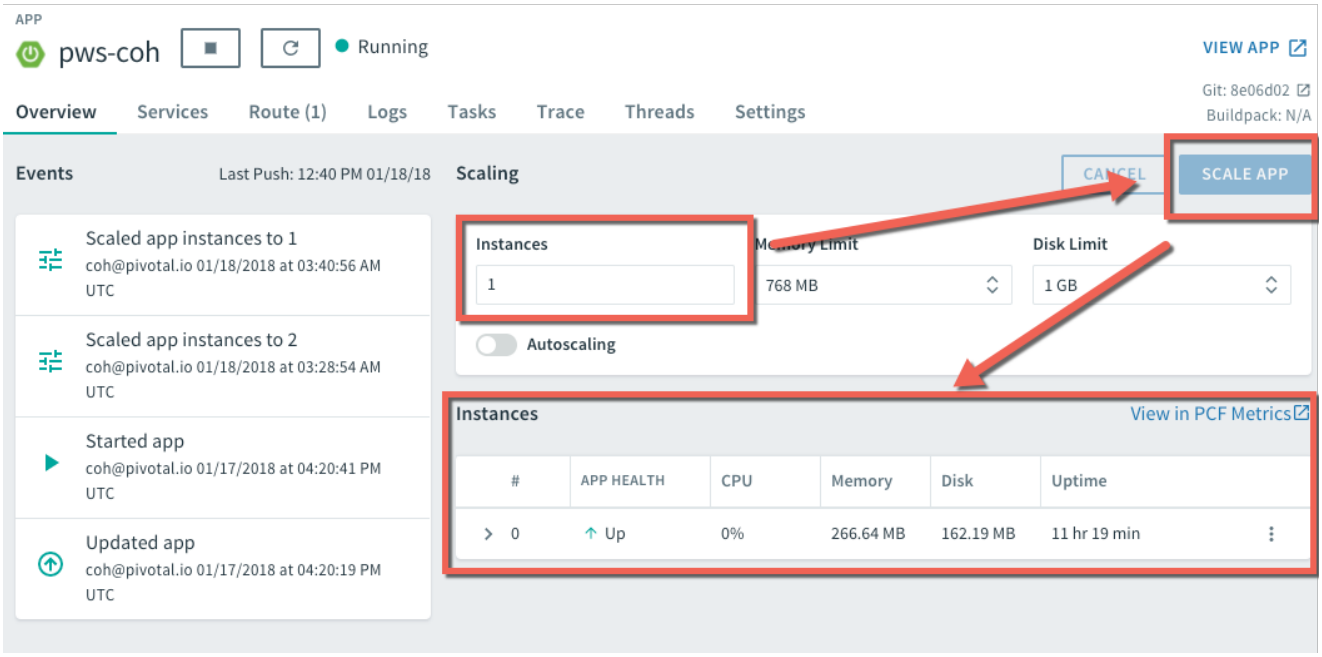


App instance 2 개로 Traffic 이 분산되어 처리하는지 확인

→ 확인 후 “Stop Load Test” 클릭하여 중지



App Manager 에서 App instance 1 개로 Scale-in



cf CLI 를 사용하여 App instance Scale Up

Disk 와 Memory 를 변경할 수 있으며, 변경 시 Application 재 시작 필요

```
$ cf scale -m 1G pws-coh

This will cause the app to restart. Are you sure you want to scale pws-coh?> y

Scaling app pws-coh in org coh-org / space development as coh@pivotal.io...
OK
Stopping app pws-coh in org coh-org / space development as coh@pivotal.io...
OK

Starting app pws-coh in org coh-org / space development as coh@pivotal.io...

0 of 1 instances running, 1 starting
1 of 1 instances running

App started


OK

App pws-coh was started using this command `JAVA_OPTS="-agentpath:$PWD/.java-buildpack/open_jdk_jre/bin/jvmkill-1.10.0_RELEASE=printHeapHistogram=1 -Djava.io.tmpdir=$TMPDIR -Djava.ext.dirs=$PWD/.java-buildpack/container_security_provider:$PWD/.java-buildpack/open_jdk_jre/lib/ext -Djava.security.properties=$PWD/.java-buildpack/security_providers/java.security $JAVA_OPTS" && CALCULATED_MEMORY=$($PWD/.java-buildpack/open_jdk_jre/bin/java-buildpack-memory-calculator-3.9.0_RELEASE -totMemory=$MEMORY_LIMIT -stackThreads=300 -loadedClasses=18417 -poolType=metaspace -vmOptions="$JAVA_OPTS") && echo JVM Memory Configuration: $CALCULATED_MEMORY && JAVA_OPTS="$JAVA_OPTS $CALCULATED_MEMORY" && SERVER_PORT=$PORT eval exec $PWD/.java-buildpack/open_jdk_jre/bin/java $JAVA_OPTS -cp $PWD/. org.springframework.boot.loader.JarLauncher`

Showing health and status for app pws-coh in org coh-org / space development as coh@pivotal.io...
```

```
OK

requested state: started
instances: 1/1
usage: 1G x 1 instances
urls: pws-coh.cfapps.io
last uploaded: Wed Jan 17 16:20:27 UTC 2018
stack: cflinuxfs2
buildpack: client-certificate-mapper=1.2.0_RELEASE container-security-provider=1.8.0_RELEASE java-buildpack=v4.5-
offline-https://github.com/cloudfoundry/java-buildpack.git#ffeefb9 java-main java-opts jvmkill-
agent=1.10.0_RELEASE open-jdk-like-jre=1.8.0_1...

     state     since                  cpu     memory       disk         details
#0   running   2018-01-18 12:44:14 PM   105.6%   378.5M of 1G   162.2M of 1G
```

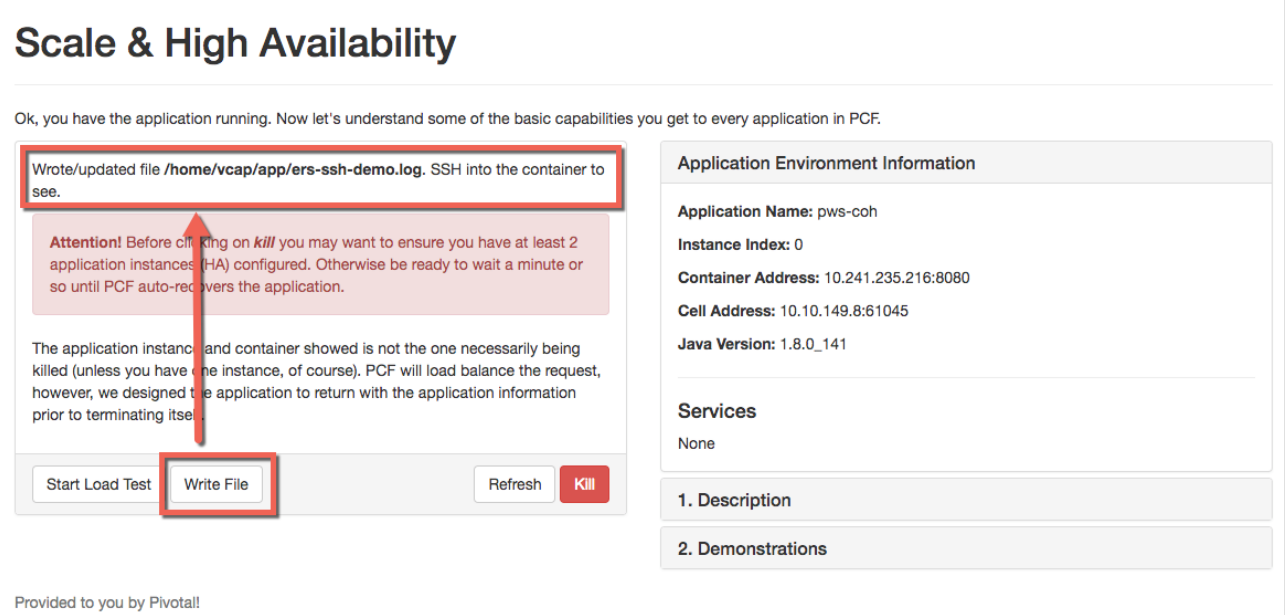
6. Application Container 에 ssh 접속하기

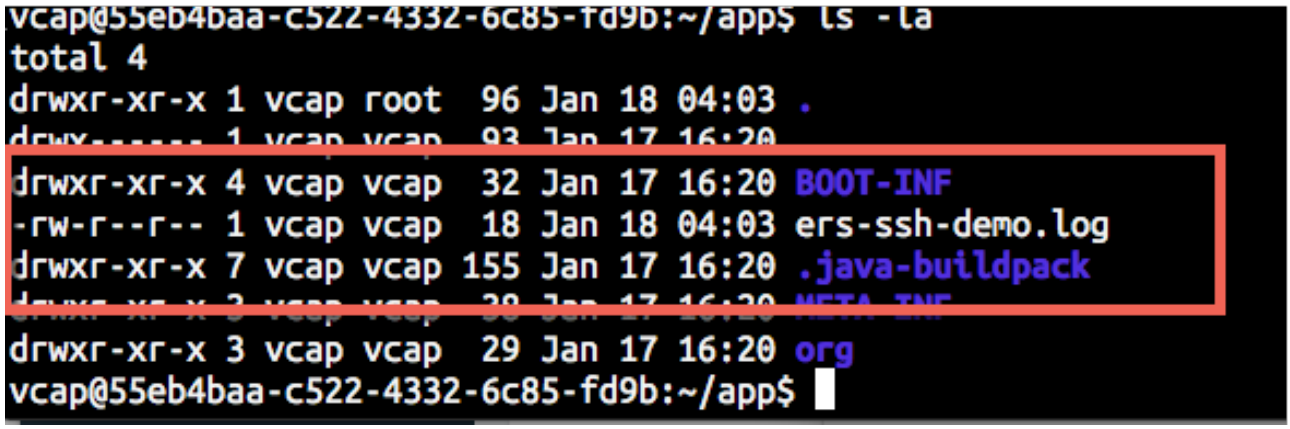
Application Debugging/Troubleshooting 시 ssh 로 애플리케이션 컨테이너에 접속하여 file system 또는 process 를 확인

```
$ cf apps
Getting apps in org coh-org / space development as coh@pivotal.io...
OK

name     requested state   instances   memory   disk   urls
c1-coh    started          1/1         1G       1G     c1-coh.cfapps.io
pcf-coh   started          1/1         768M     1G     pcf-coh.cfapps.io
pws-coh   started          1/1         1G       1G     pws-coh.cfapps.io

$ cf ssh pws-coh

vcap@55eb4baa-c522-4332-6c85-fd9b:~$
vcap@55eb4baa-c522-4332-6c85-fd9b:~$
vcap@55eb4baa-c522-4332-6c85-fd9b:~$
vcap@55eb4baa-c522-4332-6c85-fd9b:~$
vcap@55eb4baa-c522-4332-6c85-fd9b:~$ pwd
/home/vcap
vcap@55eb4baa-c522-4332-6c85-fd9b:~$
vcap@55eb4baa-c522-4332-6c85-fd9b:~$ ps -e f
  PID TTY      STAT   TIME COMMAND
  101 ?        S<sl   0:00 /etc/cf-assets/healthcheck/healthcheck -port=8080 -timeout=1000ms -liveness-interval=30s
   20 ?        S<sl   0:00 /tmp/lifecycle/diego-sshd --allowedKeyExchanges= --address=0.0.0.0:2222 --
allowUnauthenticatedClients=false --inheritDaemonEnv
  255 pts/0    S<s    0:00  \_ /bin/bash
  279 pts/0    R<+    0:00      \_ ps -e f
   19 ?        S<sl   1:08 /home/vcap/app/.java-buildpack/open_jdk_jre/bin/java -agentpath:/home/vcap/app/.java-
buildpack/open_jdk_jre/bin/jvmkill-1.10.0
    1 ?        S<sl   0:00 /var/vcap/packages/runc/bin/runc init
vcap@55eb4baa-c522-4332-6c85-fd9b:~$
```

Container file system에 파일 만들기

화면에서 “Write File”을 클릭하면, container의 /home/vcap/app/ers-ssh-demo.log 파일이 생성된다. 이 파일은 App Container가 재 시작하면 사라진다.





App 재 시작 후 파일 시스템 확인

```
$ cf restart pws-coh
Stopping app pws-coh in org coh-org / space development as coh@pivotal.io...
OK

Starting app pws-coh in org coh-org / space development as coh@pivotal.io...

0 of 1 instances running, 1 starting
1 of 1 instances running

App started
OK

Showing health and status for app pws-coh in org coh-org / space development as coh@pivotal.io...
OK

requested state: started
instances: 1/1
```

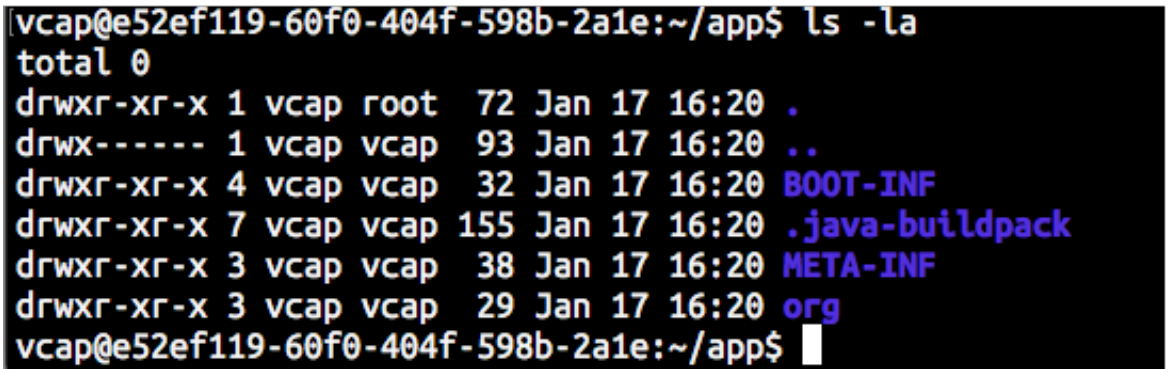
usage: 1G x 1 instances
urls: pws-coh.cfapps.io
last uploaded: Wed Jan 17 16:20:27 UTC 2018
stack: cflinuxfs2
buildpack: client-certificate-mapper=1.2.0_RELEASE container-security-provider=1.8.0_RELEASE java-buildpack=v4.5-offline-https://github.com/cloudfoundry/java-buildpack.git#ffeefb9 java-main java-opts jvmkill-agent=1.10.0_RELEASE open-jdk-like-jre=1.8.0_1...

	state	since	cpu	memory	disk	details
#0	running	2018-01-18 01:08:43 PM	167.5%	374.3M of 1G	162.2M of 1G	

$ cf ssh pws-coh

```
vcap@e52ef119-60f0-404f-598b-2a1e:~$

vcap@e52ef119-60f0-404f-598b-2a1e:~$ cd app

vcap@e52ef119-60f0-404f-598b-2a1e:~/app$ ls -la
total 0
drwxr-xr-x 1 vcap root  72 Jan 17 16:20 .
drwx------ 1 vcap vcap  93 Jan 17 16:20 ..
drwxr-xr-x 4 vcap vcap  32 Jan 17 16:20 BOOT-INF
drwxr-xr-x 7 vcap vcap 155 Jan 17 16:20 .java-buildpack
drwxr-xr-x 3 vcap vcap  38 Jan 17 16:20 META-INF
drwxr-xr-x 3 vcap vcap  29 Jan 17 16:20 org
```

App container 파일 시스템에 작성한 파일은 영속성 없음

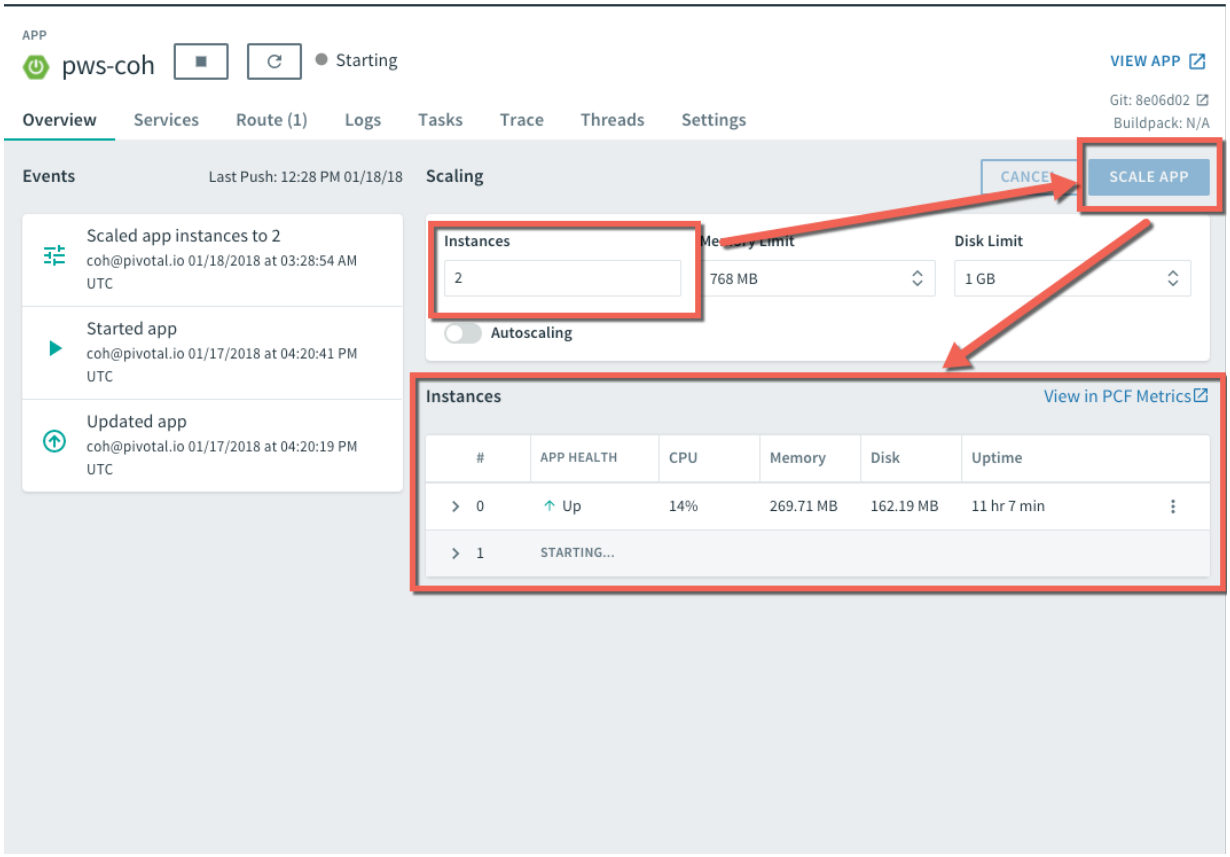


7. **High Availability**

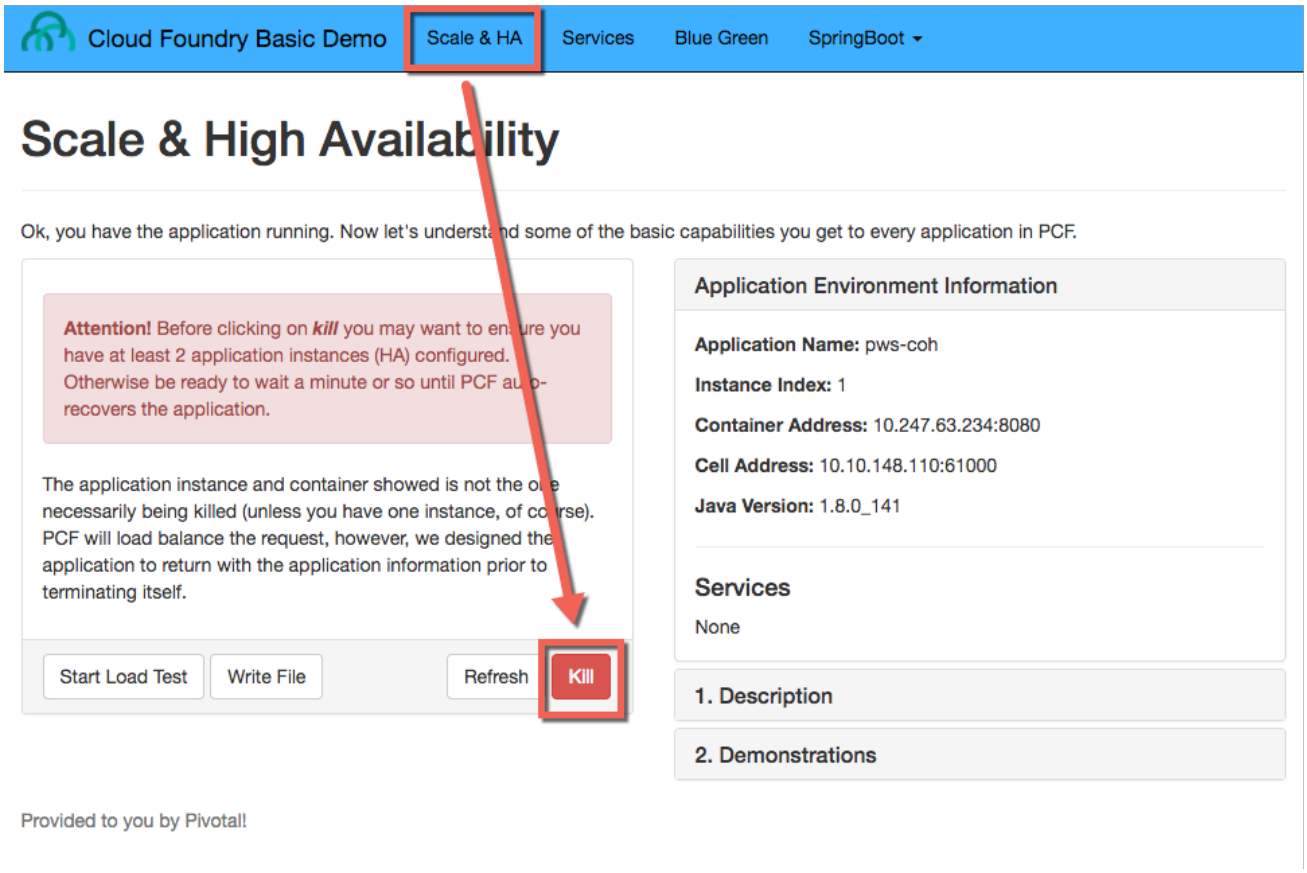
   PCF 는 4-Level High Availability 를 제공하며 그 중 Application Container 가 crash 되었을 때 즉시 재 시작하는 기능 확인

App 인스턴스 2개로 Scale Out

"Instances" 테이블에 App Health 가 "Up"으로 변경될 때까지 대기

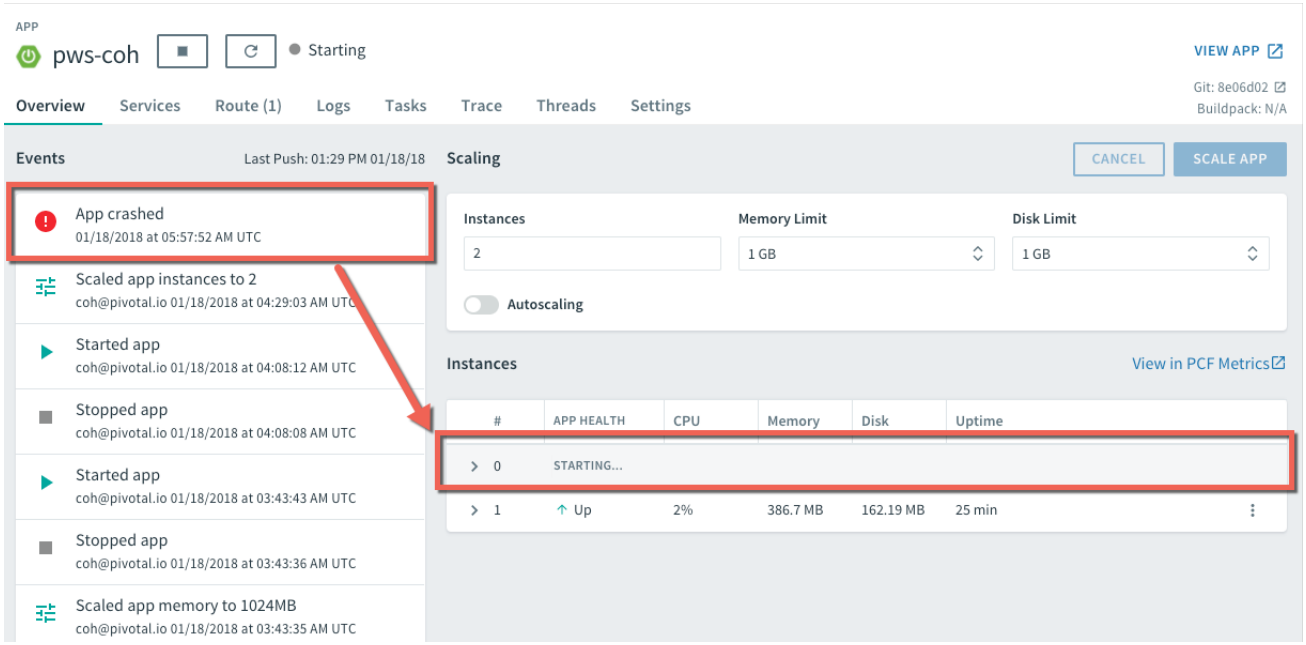


애플리케이션 화면에서 “Kill”을 클릭하여 App Instance 강제 종료



Kill 클릭 후 Browser 를 Refresh 해서 1 개의 다른 인스턴스로 서비스가 되는지 확인

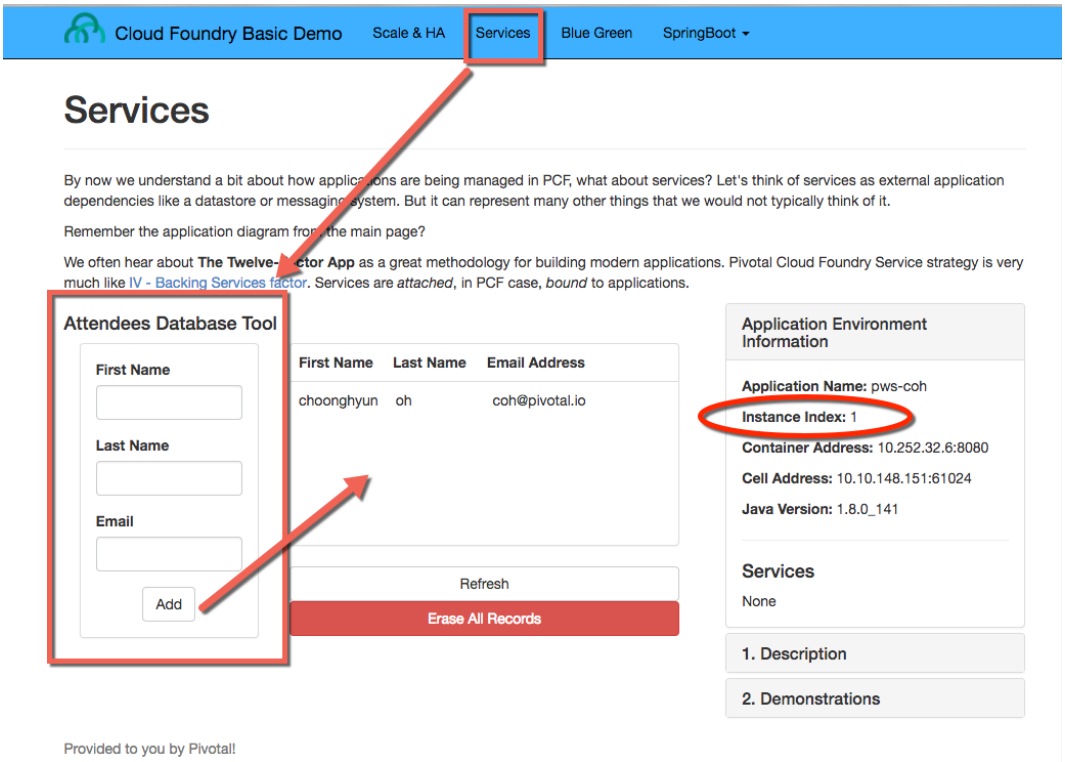
Apps Manager 또는 cf CLI 로 강제 종료된 App instance 가 재 시작되는지 확인



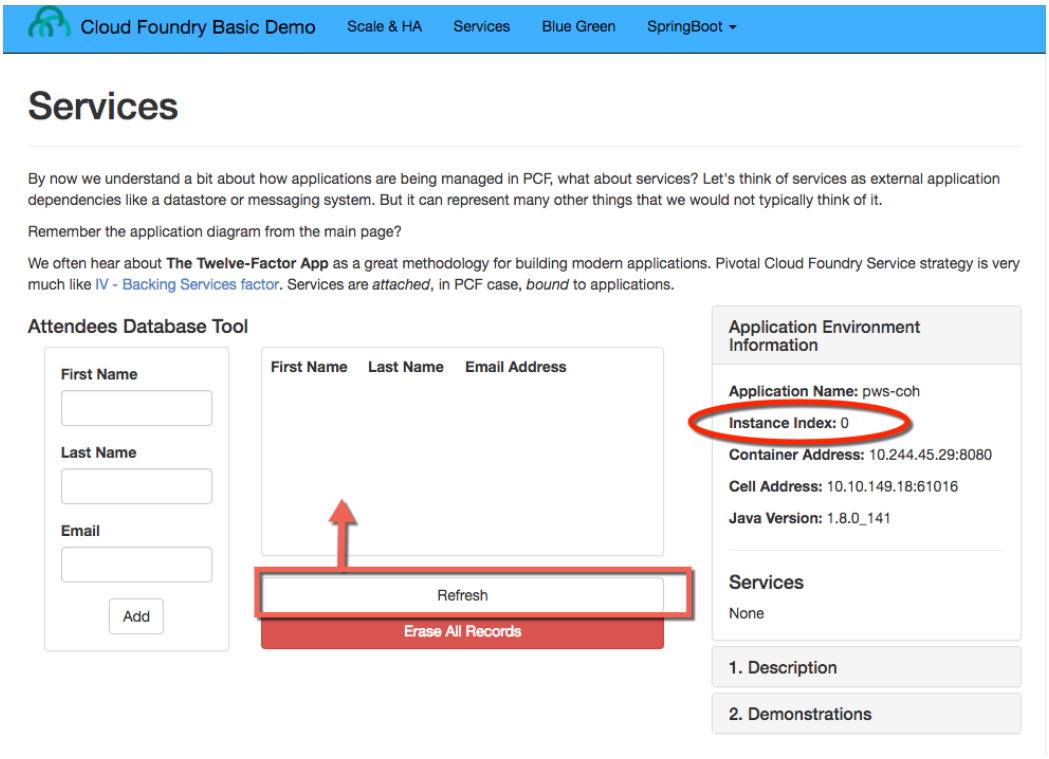
8. **Service Binding**

- 애플리케이션에서 사용하는 Backend Service(DB, QUEUE, …)는 Bind(Attach)하여 사용
- Application 소스 또는 Properties가 아닌 환경변수로 접속 정보 및 Credential을 전달 받아 사용

App Instance가 2개 이상일 때, in-memory db에 데이터를 적재하는 경우 접속한 App Instance에 따라 다른 결과를 전달

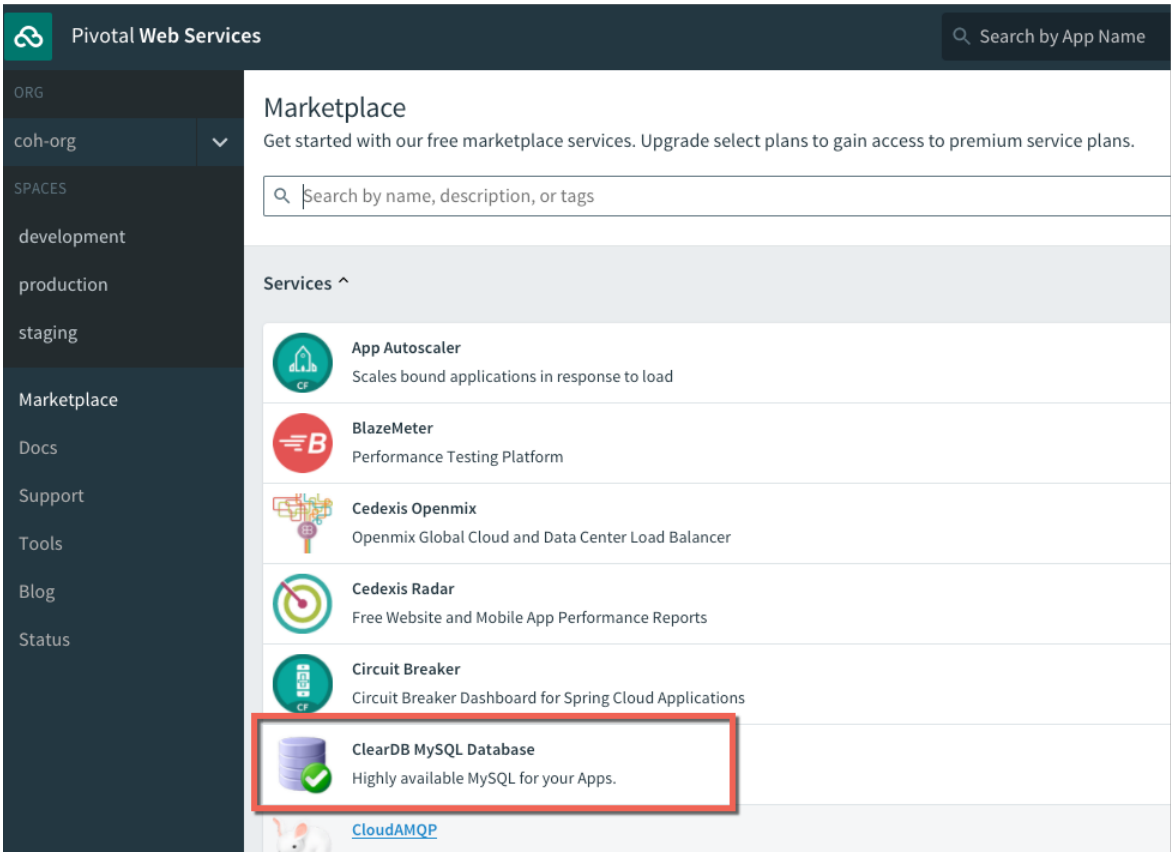


아래와 같이 다른 인스턴스로 접속 데이터 불일치 (Refresh 몇 차례 클릭)

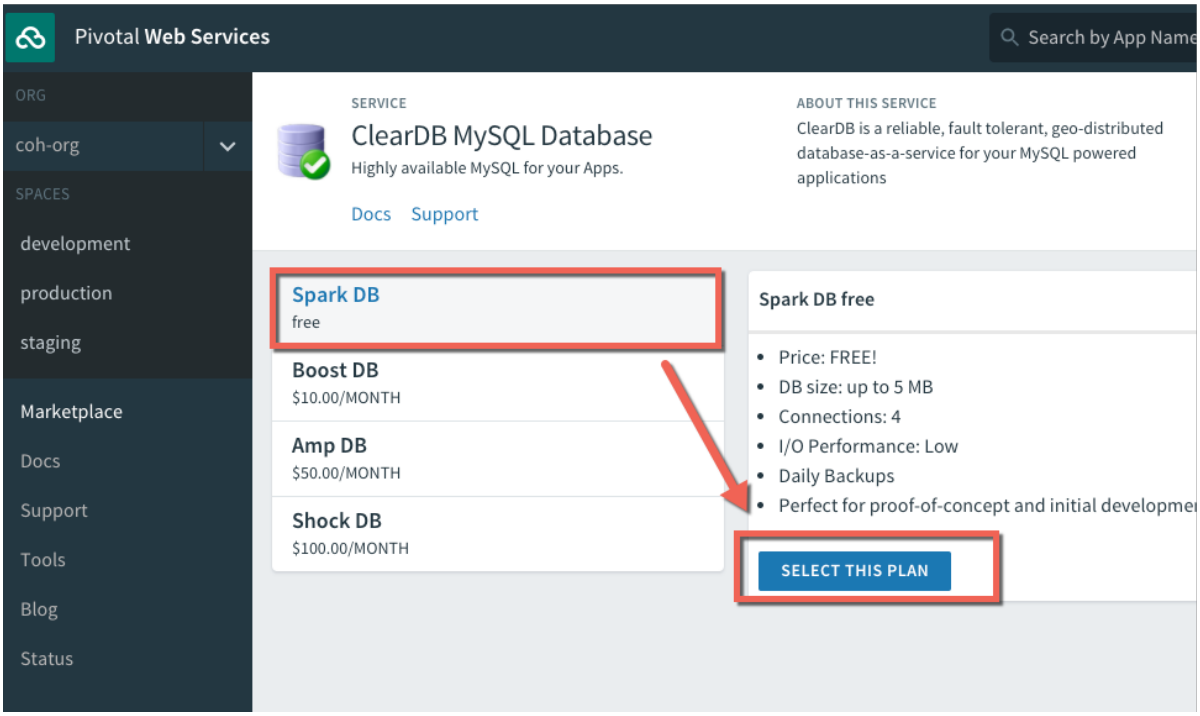


MySQL Service 인스턴스 만들기

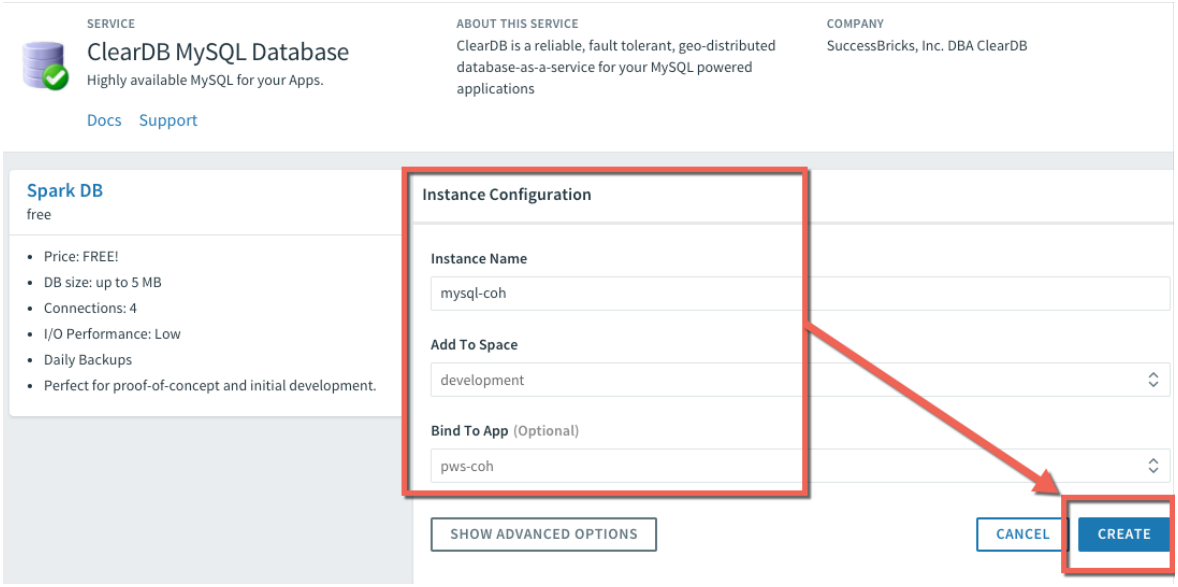
- **Marketplace에서 “ClaerDB MySQL Database” 선택**



- **“Spark DB” plan 선택**



- **Instance 구성 및 Binding application 선택**



- **Application Restaging**

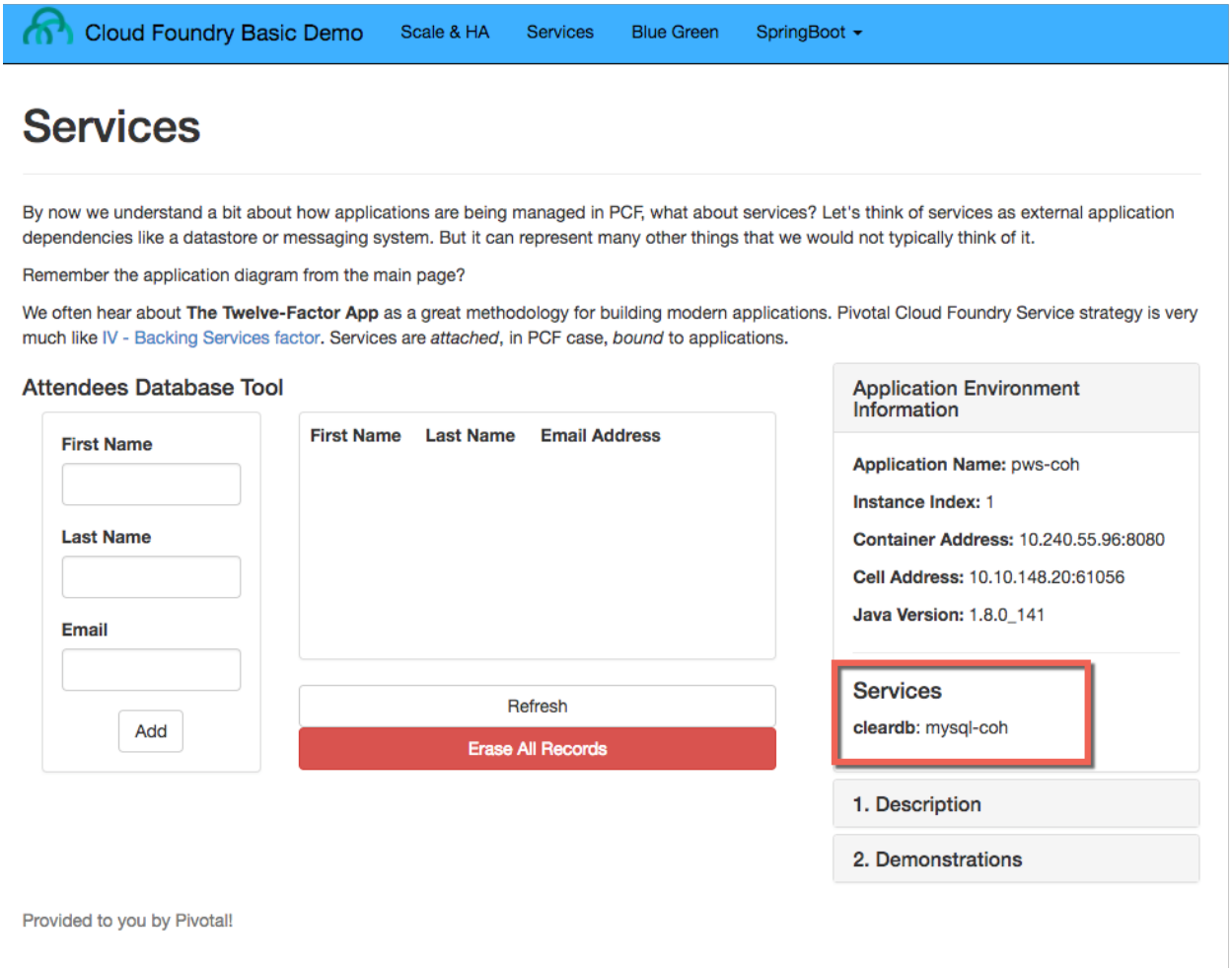
Attach한 서비스 정보를 App 환경변수로 Inject

```
$ cf restage pws-coh

Restaging app pws-coh in org coh-org / space development as coh@pivotal.io...
Downloading binary_buildpack...
Downloaded nodejs_buildpack
Downloading nodejs_buildpack...
Downloading go_buildpack...
Downloading dotnet_core_buildpack...
Downloading php_buildpack...
Downloaded php_buildpack
Downloading staticfile_buildpack...
Downloaded binary_buildpack
Downloading java_buildpack...
Downloaded dotnet_core_buildpack
Downloading dotnet_core_buildpack_beta...
Downloaded dotnet_core_buildpack_beta
Downloading python_buildpack...
Downloaded staticfile_buildpack
Downloading ruby_buildpack...
Downloaded java_buildpack
Downloaded python_buildpack
Downloaded ruby_buildpack
Downloaded go_buildpack
Creating container
Successfully created container
Downloading build artifacts cache...
Downloading app package...
Downloaded build artifacts cache (129B)
Downloaded app package (34.4M)
-----> Java Buildpack v4.5 (offline) | https://github.com/cloudfoundry/java-buildpack.git#ffeefb9
-----> Downloading Jvmkill Agent 1.10.0_RELEASE from https://java-
buildpack.cloudfoundry.org/jvmkill/trusty/x86_64/jvmkill-1.10.0_RELEASE.so (found in cache)
-----> Downloading Open Jdk JRE 1.8.0_141 from https://java-
```

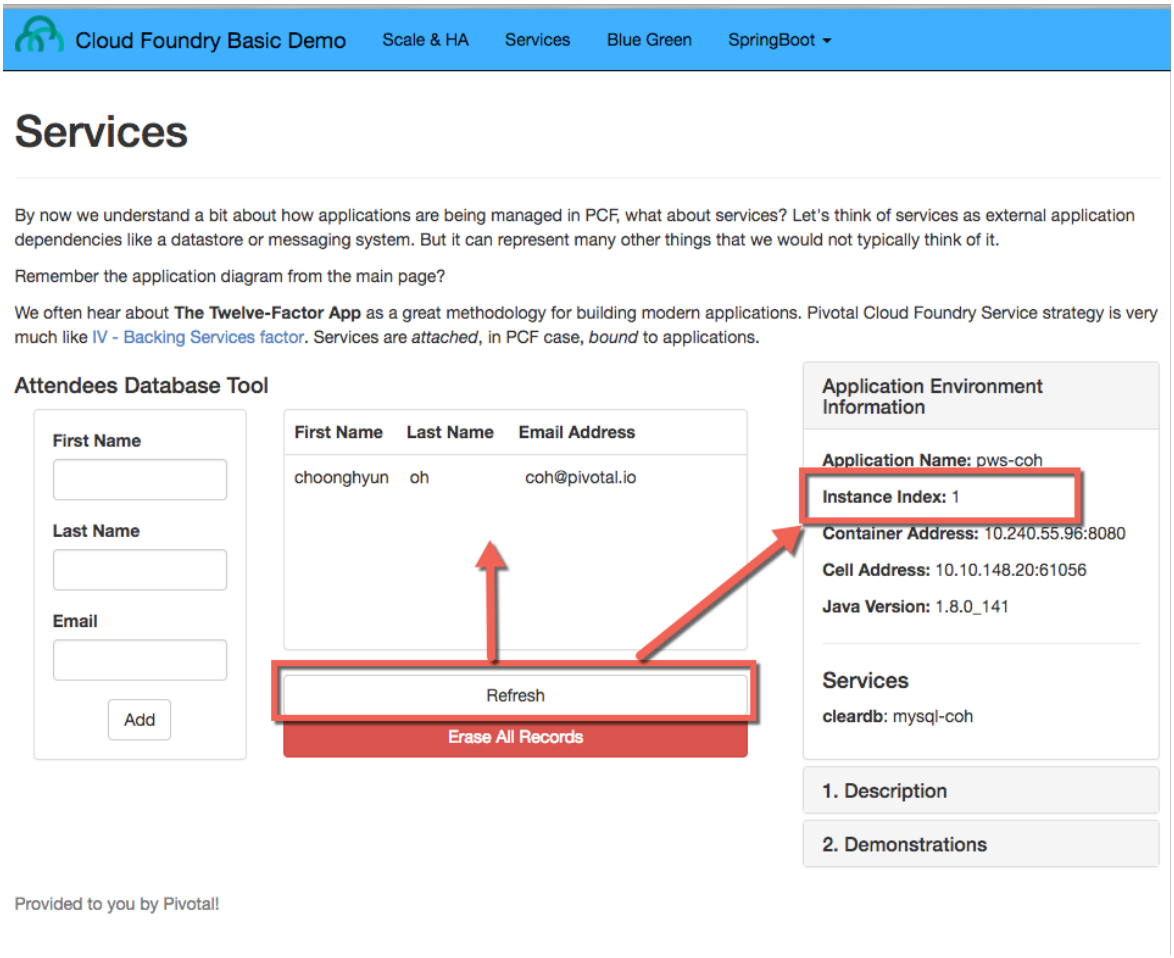
```
buildpack.cloudfoundry.org/openjdk/trusty/x86_64/openjdk-1.8.0_141.tar.gz (found in cache)
     Expanding Open Jdk JRE to .java-buildpack/open_jdk_jre (1.5s)
-----> Downloading Open JDK Like Memory Calculator 3.9.0_RELEASE from https://java-
buildpack.cloudfoundry.org/memory-calculator/trusty/x86_64/memory-calculator-
3.9.0_RELEASE.tar.gz (found in cache)
     Loaded Classes: 17708, Threads: 300
-----> Downloading Client Certificate Mapper 1.2.0_RELEASE from https://java-
buildpack.cloudfoundry.org/client-certificate-mapper/client-certificate-mapper-1.2.0_RELEASE.jar
(found in cache)
-----> Downloading Container Security Provider 1.8.0_RELEASE from https://java-
buildpack.cloudfoundry.org/container-security-provider/container-security-provider-1.8.0_RELEASE.jar
(found in cache)
-----> Downloading Spring Auto Reconfiguration 1.12.0_RELEASE from https://java-
buildpack.cloudfoundry.org/auto-reconfiguration/auto-reconfiguration-1.12.0_RELEASE.jar (found in
cache)
Exit status 0
Uploading droplet, build artifacts cache...
Uploading build artifacts cache...
Uploading droplet...
Uploaded build artifacts cache (129B)
Uploaded droplet (80.7M)
Uploading complete
Stopping instance 2d36382e-9a40-4a9f-90f9-44f470c59d49
Destroying container
Successfully destroyed container

1 of 2 instances running, 1 starting

App started

OK

App pws-coh was started using this command `JAVA_OPTS="-agentpath:$PWD/.java-
buildpack/open_jdk_jre/bin/jvmkill-1.10.0_RELEASE=printHeapHistogram=1 -Djava.io.tmpdir=$TMPDIR
-Djava.ext.dirs=$PWD/.java-buildpack/container_security_provider:$PWD/.java-
buildpack/open_jdk_jre/lib/ext -Djava.security.properties=$PWD/.java-
buildpack/security_providers/java.security $JAVA_OPTS" && CALCULATED_MEMORY=$($PWD/.java-
buildpack/open_jdk_jre/bin/java-buildpack-memory-calculator-3.9.0_RELEASE -
totMemory=$MEMORY_LIMIT -stackThreads=300 -loadedClasses=18417 -poolType=metaspace -
vmOptions="$JAVA_OPTS") && echo JVM Memory Configuration: $CALCULATED_MEMORY &&
JAVA_OPTS="$JAVA_OPTS $CALCULATED_MEMORY" && SERVER_PORT=$PORT eval exec $PWD/.java-
buildpack/open_jdk_jre/bin/java $JAVA_OPTS -cp $PWD/.
org.springframework.boot.loader.JarLauncher`

Showing health and status for app pws-coh in org coh-org / space development as coh@pivotal.io...
OK

requested state: started
instances: 2/2
usage: 1G x 2 instances
urls: pws-coh.cfapps.io
last uploaded: Wed Jan 17 16:20:27 UTC 2018
stack: cflinuxfs2
buildpack: client-certificate-mapper=1.2.0_RELEASE container-security-provider=1.8.0_RELEASE java-
```

```
buildpack=v4.5-offline-https://github.com/cloudfoundry/java-buildpack.git#ffeefb9 java-main java-opts
jvmkill-agent=1.10.0_RELEASE open-jdk-like-jre=1.8.0_1...

     state     since                  cpu    memory       disk         details
#0   running   2018-01-18 03:38:34 PM   222.9%   370.2M of 1G   162.2M of 1G
#1   running   2018-01-18 03:38:37 PM   142.1%   280M of 1G     162.2M of 1G
```

App의 Services 접속 후 Services 항목 확인



데이터 등록 및 인스턴스 변동 시 데이터 확인



9. **Blue/Green Deployment**
   App 무 중단 배포 기법 및 A/B Testing으로 활용

사전 준비: App instance 개수는 1개

```
$ cf scale -i 1 pws-coh

Scaling app pws-coh in org coh-org / space development as coh@pivotal.io...
OK
```

애플리케이션 Version 2 배포

```
$ cf push pws-coh-v2
Using manifest file /Users/coh/workspace/coinone/pcf-ers-demo/manifest.yml

Creating app pws-coh-v2 in org coh-org / space development as coh@pivotal.io...
OK

Creating route pws-coh-v2.cfapps.io...
OK

Binding pws-coh-v2.cfapps.io to pws-coh-v2...
OK

Uploading pws-coh-v2...
Uploading app files from: /var/folders/z3/kwcd43vn3s71f901r0ny2cvm0000gn/T/unzipped-
app731681166
Uploading 679.5K, 143 files
Done uploading
OK

Starting app pws-coh-v2 in org coh-org / space development as coh@pivotal.io...
Downloading nodejs_buildpack...
Downloading php_buildpack...
Downloading go_buildpack...
Downloading binary_buildpack...
Downloaded go_buildpack
Downloading python_buildpack...
Downloaded binary_buildpack
Downloading java_buildpack...
Downloaded php_buildpack
Downloaded nodejs_buildpack
Downloading dotnet_core_buildpack...
Downloading dotnet_core_buildpack_beta...
Downloaded dotnet_core_buildpack
Downloading ruby_buildpack...
Downloaded python_buildpack
Downloading staticfile_buildpack...
Downloaded dotnet_core_buildpack_beta
Downloaded ruby_buildpack
```

```
Downloaded staticfile_buildpack
Downloaded java_buildpack
Creating container
Successfully created container
Downloading app package...
Downloaded app package (34.4M)
-----> Java Buildpack v4.5 (offline) | https://github.com/cloudfoundry/java-buildpack.git#ffeefb9
-----> Downloading Jvmkill Agent 1.10.0_RELEASE from https://java-
buildpack.cloudfoundry.org/jvmkill/trusty/x86_64/jvmkill-1.10.0_RELEASE.so (found in cache)
-----> Downloading Open Jdk JRE 1.8.0_141 from https://java-
buildpack.cloudfoundry.org/openjdk/trusty/x86_64/openjdk-1.8.0_141.tar.gz (found in cache)
      Expanding Open Jdk JRE to .java-buildpack/open_jdk_jre (1.2s)
-----> Downloading Open JDK Like Memory Calculator 3.9.0_RELEASE from https://java-
buildpack.cloudfoundry.org/memory-calculator/trusty/x86_64/memory-calculator-3.9.0_RELEASE.tar.gz
(found in cache)
      Loaded Classes: 17708, Threads: 300
-----> Downloading Client Certificate Mapper 1.2.0_RELEASE from https://java-
buildpack.cloudfoundry.org/client-certificate-mapper/client-certificate-mapper-1.2.0_RELEASE.jar (found
in cache)
-----> Downloading Container Security Provider 1.8.0_RELEASE from https://java-
buildpack.cloudfoundry.org/container-security-provider/container-security-provider-1.8.0_RELEASE.jar
(found in cache)
-----> Downloading Spring Auto Reconfiguration 1.12.0_RELEASE from https://java-
buildpack.cloudfoundry.org/auto-reconfiguration/auto-reconfiguration-1.12.0_RELEASE.jar (found in
cache)
Exit status 0
Uploading droplet, build artifacts cache...
Uploading build artifacts cache...
Uploading droplet...
Uploaded build artifacts cache (129B)
Uploaded droplet (80.7M)
Uploading complete
Stopping instance 98abc6fc-303e-4e07-8d4d-959779b29d57
Destroying container
Successfully destroyed container

0 of 1 instances running, 1 starting
0 of 1 instances running, 1 starting
1 of 1 instances running

App started


OK

App pws-coh-v2 was started using this command `JAVA_OPTS="-agentpath:$PWD/.java-
buildpack/open_jdk_jre/bin/jvmkill-1.10.0_RELEASE=printHeapHistogram=1 -Djava.io.tmpdir=$TMPDIR -
Djava.ext.dirs=$PWD/.java-buildpack/container_security_provider:$PWD/.java-
buildpack/open_jdk_jre/lib/ext -Djava.security.properties=$PWD/.java-
buildpack/security_providers/java.security $JAVA_OPTS" && CALCULATED_MEMORY=$($PWD/.java-
buildpack/open_jdk_jre/bin/java-buildpack-memory-calculator-3.9.0_RELEASE -
totMemory=$MEMORY_LIMIT -stackThreads=300 -loadedClasses=18417 -poolType=metaspace -
vmOptions="$JAVA_OPTS") && echo JVM Memory Configuration: $CALCULATED_MEMORY &&
JAVA_OPTS="$JAVA_OPTS $CALCULATED_MEMORY" && SERVER_PORT=$PORT eval exec $PWD/.java-
```

buildpack/open_jdk_jre/bin/java $JAVA_OPTS -cp $PWD/. org.springframework.boot.loader.JarLauncher`

Showing health and status for app pws-coh-v2 in org coh-org / space development as coh@pivotal.io...
OK

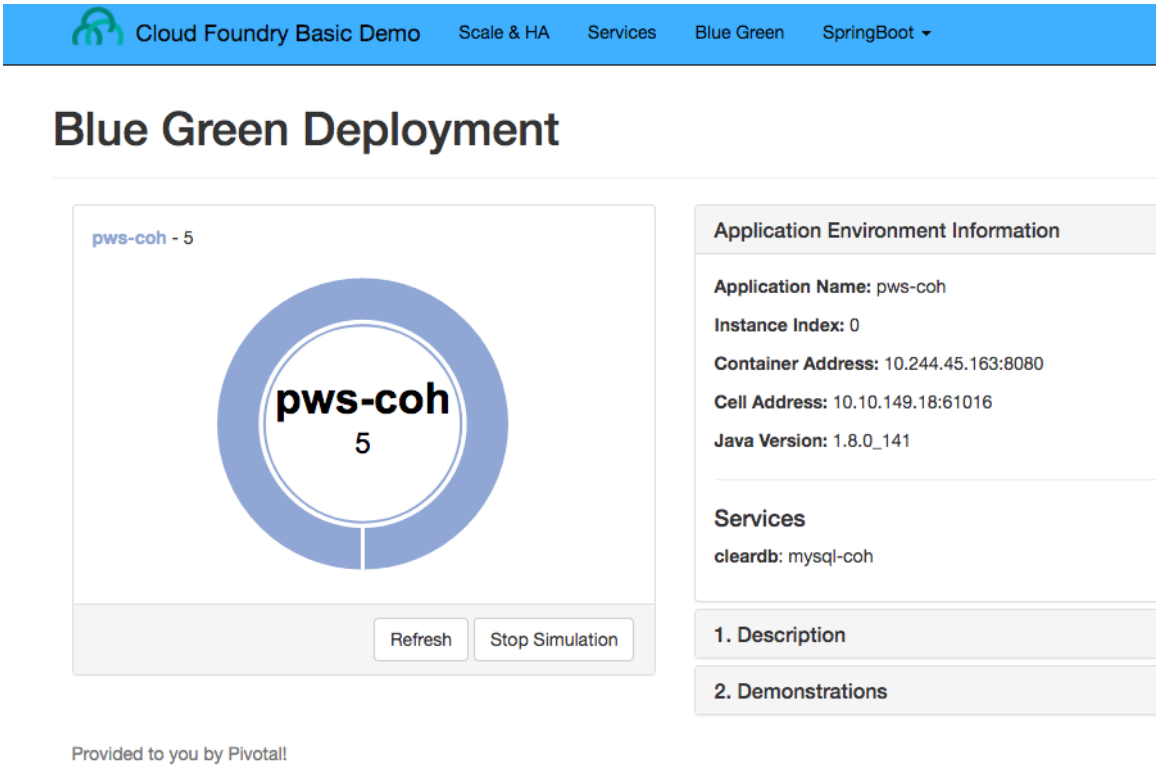
requested state: started
instances: 1/1
usage: 768M x 1 instances
urls: pws-coh-v2.cfapps.io
last uploaded: Thu Jan 18 06:53:48 UTC 2018
stack: cflinuxfs2
buildpack: client-certificate-mapper=1.2.0_RELEASE container-security-provider=1.8.0_RELEASE java-buildpack=v4.5-offline-https://github.com/cloudfoundry/java-buildpack.git#ffeefb9 java-main java-opts jvmkill-agent=1.10.0_RELEASE open-jdk-like-jre=1.8.0_1...

	state	since	cpu	memory	disk	details
#0	running	2018-01-18 03:54:54 PM	86.7%	260.4M of 768M	162.2M of 1G	

$ cf apps
Getting apps in org coh-org / space development as coh@pivotal.io...
OK

name	requested state	instances	memory	disk	urls
pws-coh	started	1/1	1G	1G	pws-coh.cfapps.io
pws-coh-v2	started	1/1	768M	1G	pws-coh-v2.cfapps.io

"Blue Green" 화면에서 "Start Simulation" Button 클릭

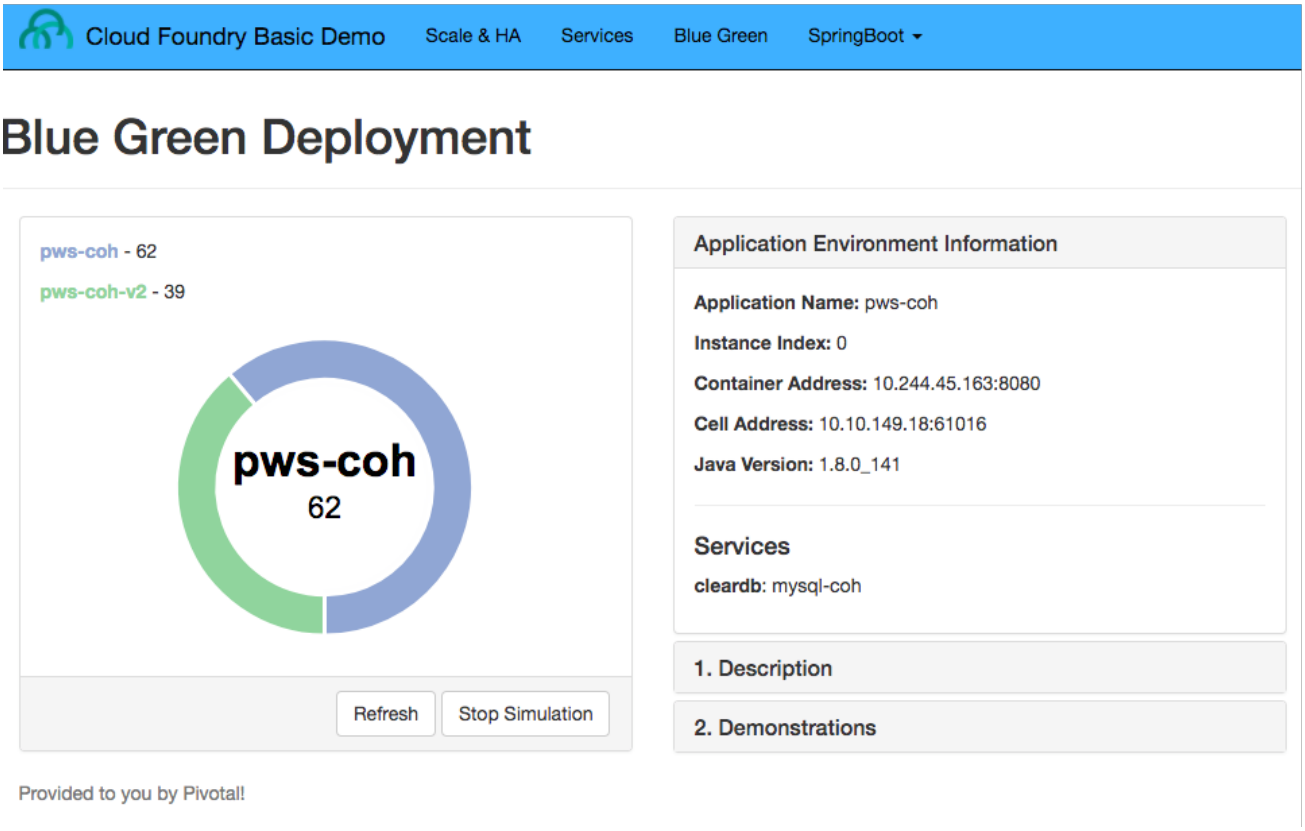


애플리케이션 Version 2에 기존 App과 동일한 hostname으로 route mapping

```
$ cf map-route pws-coh-v2 cfapps.io --hostname pws-coh

Creating route pws-coh.cfapps.io for org coh-org / space development as coh@pivotal.io...
OK
Route pws-coh.cfapps.io already exists
Adding route pws-coh.cfapps.io to app pws-coh-v2 in org coh-org / space development as coh@pivotal.io...
OK
```

```
$ cf apps
Getting apps in org coh-org / space development as coh@pivotal.io...
OK

name        requested state   instances   memory   disk   urls
pws-coh     started           1/1         1G       1G     pws-coh.cfapps.io
pws-coh-v2  started           1/1         768M     1G     pws-coh.cfapps.io, pws-coh-v2.cfapps.io
```

"Blue Green" 화면에서 Green 으로 요청이 들어오는 것을 확인



Version 2의 개수를 2개로 증가하고 화면 확인

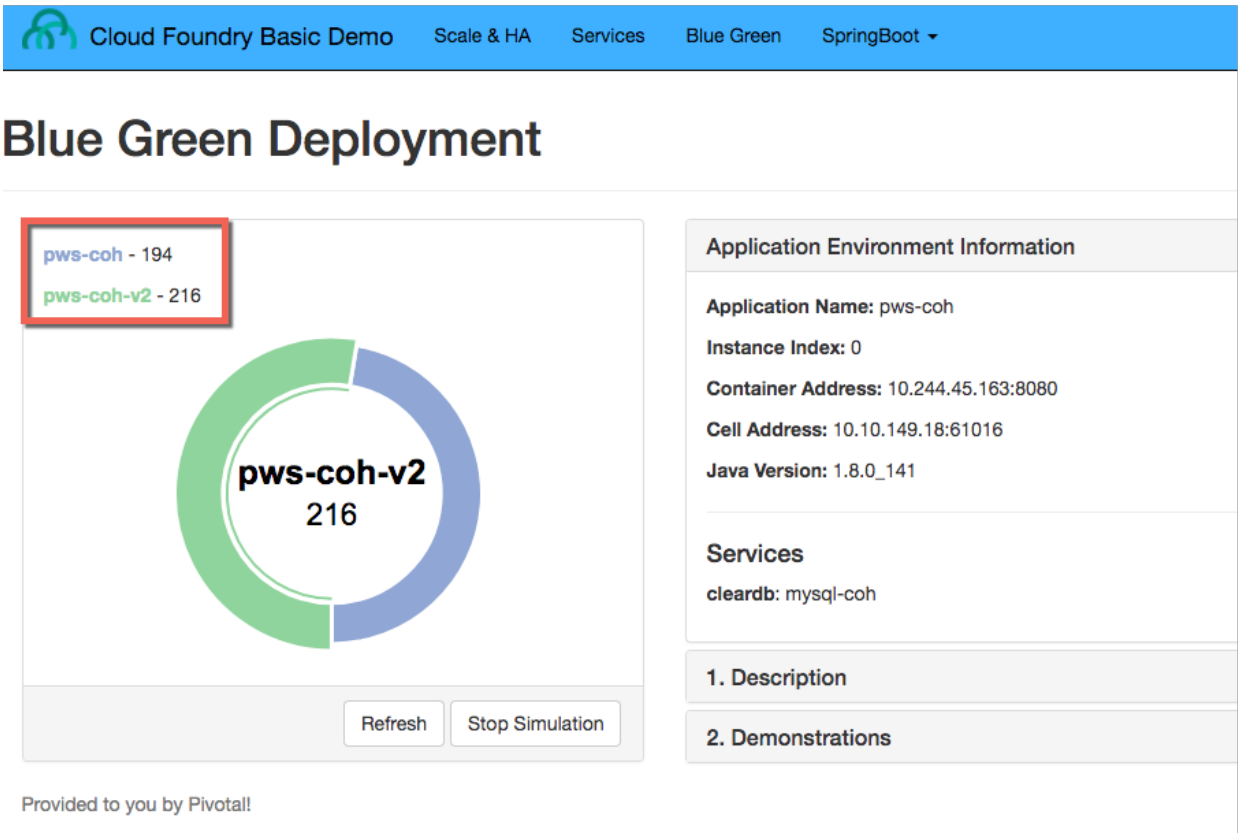
$ cf scale -i 2 pws-coh-v2

Scaling app pws-coh-v2 in org coh-org / space development as coh@pivotal.io...
OK

$ cf apps

Getting apps in org coh-org / space development as coh@pivotal.io...
OK

name	requested state	instances	memory	disk	urls
pws-coh	started	1/1	1G	1G	pws-coh.cfapps.io
pws-coh-v2	started	**2/2**	768M	1G	pws-coh.cfapps.io, pws-coh-v2.cfapps.io



이전 버전에서 route mapping 제거 및 화면 확인

```
$ cf unmap-route pws-coh cfapps.io --hostname pws-coh
Removing route pws-coh.cfapps.io from app pws-coh in org coh-org / space development as coh@pivotal.io...
OK

$ cf apps
Getting apps in org coh-org / space development as coh@pivotal.io...
OK

name        requested state   instances   memory   disk   urls
pws-coh     started           1/1         1G       1G
pws-coh-v2  started           2/2         768M     1G     pws-coh.cfapps.io, pws-coh-v2.cfapps.io
```

신규 버전으로 전환 완료: -v2만 요청을 받음